

PATENT
Customer No. 22,852
Attorney Docket No. 4329.2745

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently amended) A distributed system which makes n computers, which are connected via a network, operate synchronously, and ~~guarantees~~ provides multiplexing of at least $(n - f)$ computers,

each computer comprising:

an input candidate collection device configured to collect input data items, each of which is selected as a next candidate to be processed by each of n computers, via the network;

a first input candidate selection control device configured to ~~check~~ determine whether not less than $(n - f)$ input data items having identical contents are present, when said ~~the~~ input candidate collection device has ~~corrected~~ collected the not less than $(n - f)$ input data items, ~~if the not less than $(n - f)$ input data include not less than $(n - f)$ input data having identical contents~~, and to settle one of the input data items having identical contents as next data to be processed, when the not less than $(n - f)$ input data items ~~include not less than $(n - f)$ input data~~ having the identical contents that input data ~~as next data to be processed~~; are present;

a second input candidate selection control device configured to ~~check~~ determine whether the majority of collected input data items having identical contents are present, when said ~~the~~ first input candidate selection control device determines that the ~~collected~~ ~~input data do not include~~ not less than $(n - f)$ input data items having identical contents are not present, ~~if the collected data include input data which have identical contents~~

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~~and hold the majority of the number of collected input data, and to cause the input candidate collection device to reexecute collection after selecting the input data item as a self candidate and discard the all input data items of other candidates, when the collected data include input data which have identical contents and hold the majority of the number of collected input data items are present; that input data as a self candidate, and make said input candidate collection device re-execute collection of input data after all input data of other candidates are discarded; and~~

a third input candidate selection control device configured to cause the input candidate collection device to reexecute collection after arbitrarily selecting input data item from the collected input data items as a self candidate and discarding all input data items of other candidates, ~~arbitrarily select, when said the~~ second input candidate selection control device determines that the majority of the collected input data items are not present ~~collected data do not include input data which have identical contents and hold the majority of the number of collected input data, input data from the collected input data as a self candidate, and make said input candidate collection device re-execute collection of input data after all input data of other candidates are discarded.~~

2. (Original) A system according to claim 1, wherein f is a maximum integer which satisfies $3f < n$.

3. (Currently amended) A system according to claim 1, wherein each computer further comprises:

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a journal device configured to hold the input data item settled by ~~said the~~ first input candidate selection control device;

a first input candidate adjustment control device configured to send the input data item held in the journal device as settled input data item, when another computer collects an input data item of a step that has already been settled in the self computer ~~input data held in said journal device as settled input data~~; and

a second input candidate adjustment control device configured to settle input data item as next data to be processed, when ~~settled the~~ input data item is sent from another computer as settled input data item upon collecting input data items by ~~said the~~ input candidate collection device ~~that input data as next data to be processed~~.

4. (Currently amended) A system according to claim 3, wherein ~~said the~~ journal device holds the input data items in an order from a latest input data item in correspondence with a predetermined number of steps,

~~said the~~ first input candidate adjustment control device sends a predetermined message to another computer, ~~includes an informing device configured to send~~, when ~~said the~~ journal device does not hold a settled input data item to be sent to another computer, ~~a message indicating this to the other computer~~, and

each computer further comprises;

a state holding device configured to hold ~~immediately preceding states of the self~~ computer just before the settled input data item is processed in steps already settled in the self computer in correspondence with a predetermined number of steps;

a state exchange device configured to exchange the ~~immediately preceding state~~ in each step held by ~~said the~~ state holding device with another computer; and

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a skip device configured to acquire a state corresponding to the latest settled step of another computer, in which the settled step is most advanced among all the other computers, by the state exchange device, and to copy the acquired state to the self computer, when a sum of the number of collected input data items and the number of the predetermined messages which are sent from the other computers ~~and indicate that settled input data is not held in said journal device~~ is not less than $(n - f)$, and the number of collected input data items is less than $(n - f)$ upon collecting input data items by ~~said the~~ input candidate collection device, ~~an immediately preceding state in the latest settled step in another computer, in which the settled step has most advanced among all other computers, via said state exchange device, and copy the acquired state to the self computer.~~

5. (Currently amended) A system according to claim 1, wherein each computer further comprises:

a counter configured to count a virtual time used in a process of an input data item;

a first input data item generation device configured to periodically generate a first input data item for giving an increment timing of a value of ~~said the~~ counter;

a second input data item generation device configured to ~~store a system time of the self computer and generate second input data~~ generate a second input data item for giving a comparison timing between ~~the a~~ system time and the virtual time counted by ~~said the~~ counter, the second input data item including the system time of the self computer; and

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a virtual time adjustment device configured to compare the system time obtained from the second input data item with the virtual time counted by ~~said the~~ counter, and ~~set to set an increment width of the value of the counter upon processing the first input data item to be large~~, when the system time leads the virtual time, ~~an increment width of the value of said counter upon processing the first input data to be large~~.

6. (Currently amended) A multiplexing control method for a distributed system which makes n computers, which are connected via a network, operate synchronously, and ~~guarantees~~ provides multiplexing of at least $(n - f)$ computers,

each computer ~~comprising~~ performing:

the an input candidate collection step of collecting input data items, each of which is selected as a next candidate to be processed by each of n computers, via the network;

the a first input candidate selection control step of ~~checking~~, determining whether not less than $(n - f)$ input data items having identical contents are present, when the input candidate collection step has ~~corrected~~ collected the not less than $(n - f)$ input data items, ~~if the not less than $(n - f)$ input data include not less than $(n - f)$ input data having identical contents~~, and ~~settle~~ settling one of the input data items having identical contents as next data to be processed, when the not less than $(n - f)$ input data items ~~include not less than $(n - f)$ input data having identical contents are present~~, that input data ~~as next data to be processed~~;

the a second input candidate selection control step of ~~checking~~ determining whether or not the majority of collected input data items having identical contents are

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present, when it is determined in the first input candidate selection control step that the ~~collected input data do not include~~ not less than $(n - f)$ input data items having identical contents are not present, if the ~~collected data include input data which have identical contents and hold the majority of the number of collected input data~~, selecting and causing the input candidate collection step to reexecute collection after selecting the input data item as a self candidate and discarding the all input data items of other candidates, when the ~~collected data include input data which have identical contents and hold the majority of the number of collected input data items are present~~, that input data as a self candidate, and making the input candidate collection step re-execute collection of input data after all input data of other candidates are discarded; and

the a third input candidate selection control step of causing the input candidate collection step to reexecute collection after arbitrarily selecting an input data item from the collected input data items as a self candidate and discarding all the input data items of other candidates, ~~arbitrarily selecting~~, when it is determined in the second input candidate selection control step that the majority of the collected input data items are not present ~~collected data do not include input data which have identical contents and hold the majority of the number of collected input data~~, input data from the collected input data as a self candidate, and making the input candidate collection step re-execute collection of input data after all input data of other candidates are discarded.

7. (Original) A method according to claim 6, wherein f is a maximum integer which satisfies $3f < n$.

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8. (Currently amended) A method according to claim 6, wherein each computer further comprises performs:

~~the~~ a journal step of holding the input data item settled in the first input candidate selection control step;

~~the~~ a first input candidate adjustment control step of sending the input data item held in the journal step as settled input data item, when another computer collects an input data item of a step that has already been settled in the self computer, ~~input data held in the journal step as settled input data~~; and

~~the~~ a second input candidate adjustment control step of settling input data item as next data to be processed, when ~~settled~~ the input data item is sent from another computer as settled input data item upon collecting input data items in the input candidate collection step, ~~that input data as next data to be processed~~.

9. (Currently amended) A method according to claim 8, wherein the journal step ~~includes the step of holding~~ holds the input data items in an order from latest input data item in correspondence with a predetermined number of steps,

~~the first input candidate adjustment control step includes the informing step of sending~~ sends a predetermined message to another computer, when settled input data to be sent to another computer is not held in the journal step, ~~a message indicating this to the other computer~~, and

each computer further comprises performing:

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~~the~~ a state holding step of holding immediately preceding states of the self
computer just before the settled input data item is processed in steps already settled in
the self computer in correspondence with a predetermined number of steps;

~~the~~ a state exchange step of exchanging the immediately preceding state in each
step held in the state holding step with another computer; and

~~the~~ a skip step of acquiring a state corresponding to the latest settled step of
another computer, in which the settled step has most advanced among all the other
computers, by the state exchange step, and copying the acquired state to the self
computer, when a sum of the number of collected input data items and the number of
the predetermined messages which are sent from other computers ~~and indicate that~~
~~settled input data is not held in the journal step~~ is not less than $(n - f)$, and the number
of collected input data items is less than $(n - f)$ upon collecting input data items in the
input candidate collection step, ~~an immediately preceding state in the latest settled step~~
~~in another computer, in which the settled step has most advanced among all other~~
~~computers, via the state exchange step, and copying the acquired state to the self~~
~~computer.~~

10. (Currently amended) A method according to claim 6, wherein each
computer further ~~comprises~~ performs:

~~the~~ a first input data item generation step of periodically generating a first input
data item for giving an increment timing of a value of a counter configured to count a
virtual time used in a process of input data;

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~~the a second input data item generation step of storing a system time of the self computer and generating second input data~~ generating a second input data item for giving a comparison timing between ~~the a~~ a system time and the virtual time counted by the counter, the second input data item including the system time of the self computer; and

~~the a~~ a virtual time adjustment step of comparing the system time obtained from the second input data item with the virtual time counted by the counter, and setting an increment width of the value of the counter upon processing the first input data item to be large, when the system time leads the virtual time, ~~an increment width of the value of the counter upon processing the first input data to be large.~~